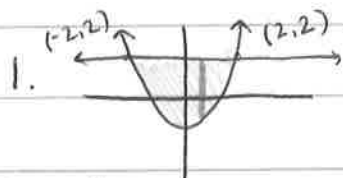
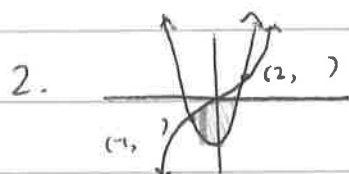


Review Problems



$$\int_{-2}^2 2 - (x^2 - 2) dx$$

$$\int_{-2}^2 -x^2 + 4 dx = 10.667$$

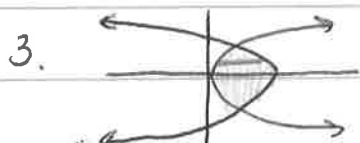


$$x^3 = 3x^2 - 4$$

$$x^3 - 3x^2 + 4 = 0$$

$$\int_{-2}^2 x^3 - (3x^2 - 4) dx$$

$$\int_{-2}^2 x^3 - 3x^2 + 4 dx = 6.75$$



$$y^2 = 3 - 2x^2$$

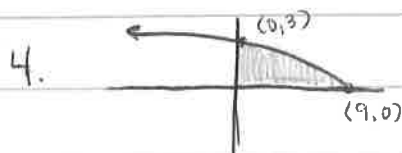
$$3y^2 = 3$$

$$\int_{-1}^1 3 - 2y^2 - y^2 dy$$

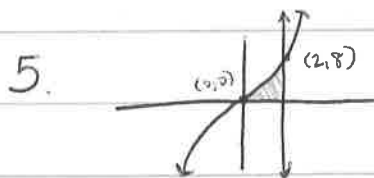
$$y^2 = 1$$

$$\int_{-1}^1 3 - 3y^2 dy = 4$$

$$y = \pm 1$$

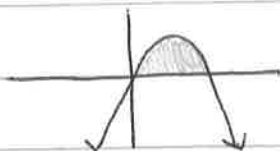


$$\pi \int_0^9 (\sqrt{9-x})^2 dx \quad \text{or} \quad 2\pi \int_0^3 (y)(9-y^2) dy$$



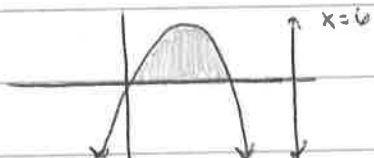
$$\pi \int_0^8 (2 - \sqrt[3]{x})^2 dy \quad \text{or} \quad 2\pi \int_0^2 (2-x)(x^3) dx$$

6.



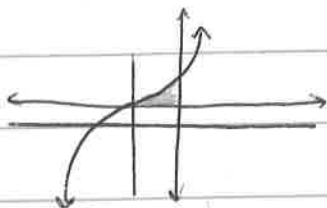
$$2\pi \int_0^2 (x)(2x - x^2) dx$$

7.



$$2\pi \int_0^4 (6-x)(4x - x^2) dx$$

8.



$$a) \pi \int_0^2 (x^3 + 1)^2 - (1)^2 dx$$

or

$$2\pi \int_1^9 (y)(2 - \sqrt[3]{y-1}) dy$$

$$b) \pi \int_1^9 (2)^2 - (\sqrt[3]{y-1})^2 dy$$

or

$$2\pi \int_0^2 (x)(x^3 + 1 - 1) dx$$

$$c) \pi \int_0^2 (x^3 + 1 - 1)^2 dx$$

or

$$2\pi \int_1^9 (y-1)(2 - \sqrt[3]{y-1}) dy$$

$$d) \pi \int_1^9 (2 - \sqrt[3]{y-1})^2 dy$$

or

$$2\pi \int_0^2 (2-x)(x^3 + 1 - 1) dx$$

$$e) \pi \int_1^9 (3 - \sqrt[3]{y-1})^2 - (1)^2 dy$$

or

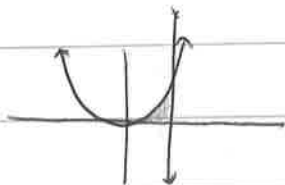
$$2\pi \int_0^2 (3-x)(x^3 + 1 - 1) dx$$

$$f) \pi \int_0^2 (x^3 + 1 + 2)^2 - (3)^2 dx$$

or

$$2\pi \int_1^9 (y+2)(2 - \sqrt[3]{y-1}) dy$$

9.



$$a) \pi \int_0^4 (2 - \sqrt{y})^2 dy$$

or

$$2\pi \int_0^2 (2-x)(x^2) dx$$

$$b) \pi \int_0^4 (4 - \sqrt{y})^2 - (2)^2 dy$$

or

$$2\pi \int_0^2 (4-x)(x^2) dx$$

$$c) \pi \int_0^4 (3)^2 - (\sqrt{y} + 1)^2 dy$$

or

$$2\pi \int_0^2 (x+1)(x^2) dx$$

$$d) \pi \int_0^2 (4)^2 - (4 - x^2)^2 dx$$

or

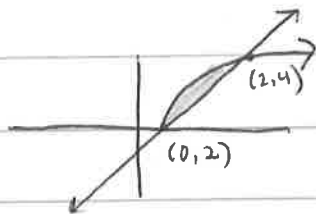
$$2\pi \int_0^4 (4-y)(2 - \sqrt{y}) dy$$

$$e) \pi \int_0^2 (x^2 + 3)^2 - (3)^2 dx$$

or

$$2\pi \int_0^4 (y+3)(2 - \sqrt{y}) dy$$

10.

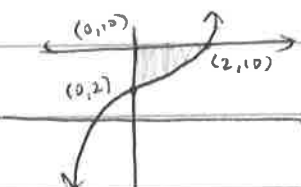


$$\pi \int_2^4 (\sqrt{2x-4})^2 - (x-2)^2 dx$$

or

$$2\pi \int_0^2 (y)(y+2 - (\frac{y^2+4}{2})) dy$$

11.



$$a) \pi \int_0^2 (10)^2 - (x^3+2)^2 dx$$

or

$$2\pi \int_2^{10} (y)(\sqrt[3]{y-2}) dy$$

$$b) \pi \int_2^{10} (\sqrt[3]{y-2})^2 dy$$

or

$$2\pi \int_0^2 (x)(10 - (x^3+2)) dx$$

$$c) \pi \int_0^2 (10 - (x^3+2))^2 dx$$

or

$$2\pi \int_2^{10} (10-y)(\sqrt[3]{y-2}) dy$$

$$d) \pi \int_2^{10} (3)^2 - (3 - \sqrt[3]{y-2})^2 dy$$

or

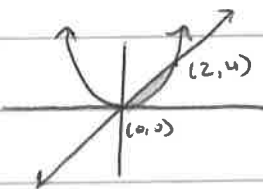
$$2\pi \int_0^2 (3-x)(10 - (x^3+2)) dx$$

$$e) \pi \int_0^2 (11)^2 - (x^3+2+1)^2 dx$$

or

$$2\pi \int_2^{10} (y+1)(\sqrt[3]{y-2}) dy$$

12.



washer:

$$\pi \int_0^2 (2x)^2 - (x^2)^2 dx$$

$$\pi \int_0^2 4x^2 - x^4 dx$$

$$\pi \left(\frac{4}{3}x^3 - \frac{1}{5}x^5 \right) \Big|_0^2$$

$$\pi \left[\left(\frac{4}{3}(2)^3 - \frac{1}{5}(2)^5 \right) - (0) \right]$$

$$\pi \left[\frac{32}{3} - \frac{32}{5} \right]$$

$$\pi \left[\frac{160}{15} - \frac{96}{15} \right]$$

$$\frac{64}{15} \pi$$

shells:

$$2\pi \int_0^4 (y)(\sqrt{y} - \frac{y}{2}) dy$$

$$2\pi \int_0^4 y^{3/2} - \frac{1}{2}y^2 dy$$

$$2\pi \left(\frac{2}{5}y^{5/2} - \frac{1}{6}y^3 \right) \Big|_0^4$$

$$2\pi \left[\left(\frac{2}{5}(4)^{5/2} - \frac{1}{6}(4)^3 \right) - (0) \right]$$

$$2\pi \left[\frac{64}{5} - \frac{64}{6} \right]$$

$$2\pi \left[\frac{384}{30} - \frac{320}{30} \right]$$

$$2\pi \left[\frac{64}{30} \right]$$

$$\frac{64}{15} \pi$$

13.



$$x^2 + y^2 = 9$$

$$y^2 = 9 - x^2$$

$$y = \pm \sqrt{9 - x^2}$$

$$\frac{\pi}{2} \int_{-3}^3 (2\sqrt{9-x^2})^2 dx$$

$$\frac{\pi}{2} \int_{-3}^3 4(9-x^2) dx$$

$$2\pi \int_{-3}^3 9 - x^2 dx$$

$$2\pi \left(9x - \frac{1}{3}x^3 \right) \Big|_{-3}^3$$

$$2\pi \left[(9(3) - \frac{1}{3}(3)^3) - (9(-3) - \frac{1}{3}(-3)^3) \right]$$

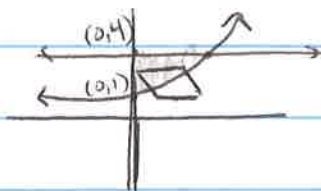
$$2\pi \left[(27 - 9) - (-27 + 9) \right]$$

$$2\pi [36]$$

$$72\pi$$

2 should not
be there

14.



$$y = e^x$$

$$x = \ln y$$

$$\int_1^4 (\ln y)^2 dy$$

$$2.597$$